APPENDIX G

Drilling and LPT Investigation Program

TECHNICAL MEMORANDUM

DATE January 8, 2010 **PROJECT No.** 09-1428-5007
Doc. No. 981 Ver. 0

TO Eric Lamontagne and Gaston Blanchette
Agnico-Eagle Mines Limited Meadowbank Division

CC Fiona Esford

FROM Charlie Harrison, Dan Walker and Michel Julien **EMAIL** mjulien@golder.com

DRILLING AND LPT INVESTIGATION PROGRAM, BAY-GOOSE DIKE - MEADOWBANK GOLD PROJECT, NUNAVUT

As part of the Quality Assurance (QA) program for the Bay-Goose Dike, at the Meadowbank Gold Project, Nunavut, Golder Associates Ltd. (Golder) supervised a drilling and Large Penetration Testing (LPT) program, between September 17 and 20, 2009, to assess the densification of the 19 mm minus core backfill materials (core backfill) within the Bay-Goose Dike following dynamic compaction. A site plan indicating the location of the boreholes (BH09-01 to BH09-06) drilled is shown in Figure 1.

This technical memorandum summarises the equipment used, the drilling and sampling methods carried out, and the results of the in-situ testing program. At the time of the testing, dynamic compaction of the core backfill had been completed and installation of the cut-off wall was underway. Initially it was proposed that the LPT program be carried out pre- and post-dynamic compaction, but this was not possible due to delays related to the shipment of the LPT hammer, and technical limitations associated with the site equipment originally proposed to deploy the hammer (further details provided below).

1.0 EQUIPMENT

1.1 LPT Sampler

LPT is a generic term used to describe a scaled up version of the widely used Standard Penetration Test (SPT) (Daniel et al., 2003). The 38 mm (1.5-inch) inner diameter split spoon sampler used in the SPT reliably obtains soil samples of very loose to dense, sand sized materials, or finer, in soft to very hard cohesive soils. However, the SPT is generally considered to be unreliable in gravelly soils. Therefore, a LPT sampler with a scaled up 102 mm (4-inch) inner diameter (Figure 2 and Photograph 1) was selected to sample the 19 mm core backfill materials at the test site.

1.2 Automatic Trip Hammer

The LPT itself consists of driving the larger diameter split-spoon sampler a standard 450 mm into the ground using an automatic trip hammer, while measuring the number of hammer blows deployed for each 150 mm

interval (the blow count). The total blow count for the second and third intervals, totalling 300 mm driven depth, is referred to as the LPT N-value.

Due to the scaled up diameter of the LPT sampler, a custom fabricated automatic trip hammer (Photograph 2) was required to provide the required energy to drive the larger sampler the standard distance (Daniel and Howie, 2009).

The hammer used was manufactured by Foremost Mobile Drilling and consisted of a 109 kg (240 lbs) or 1070 N slug dropped a standard 450 mm (18-inches) to deliver a scaled up 814 N-m force. The hammer dropped automatically through a pneumatically operated chain drive which picked up the hammer once every cycle to minimize double "hammer-strike" occurrences typically experienced by hand-operated cat head pulley/drop systems.

1.3 Pile Driving Analyzer (PDA)

As the LPT is a non-traditional testing method, there are currently no direct correlations between the blow counts collected and the in-situ density of the materials being sampled. However, LPT N-values can be indirectly correlated to in-situ density by first correlating to equivalent SPT N-values by measuring the energy transferred to the drill rods and LPT sampler. This was achieved through the use of a pile driving analyzer (PDA).

The PDA used consisted of a field computer and a NW type drill rod fixed with two strain gauges and two accelerometers (Photograph 3) in accordance with ASTM D4633-05 – Standard Test Method for Energy Measurement for Dynamic Penetrometers. The instrumented rod was connected to the drill rod that the hammer impacts. With each blow of the hammer, the energy that was transferred to the drill rod was measured and recorded by the PDA computer (see Appendix I). This information was used to correlate the LPT N-values to SPT N_{60} values.

1.4 Drilling and Sampling Method

The original drilling and in-situ program, planned in consultation / coordination with Forage Orbit-Garant Drilling Inc. (Orbit-Garant), called for advancing up to ten boreholes using a diamond drill rig supplied by Orbit-Garant. The drill, which was already on site, was to be used both to advance the boreholes via mud rotary drilling techniques and to operate the automatic trip hammer. However, upon mobilization of the hammer to site, it was determined that the drill allocated to the program by Orbit-Garant was not capable of operating the hammer. The orientation of the drill mast and winter enclosure was such that the hammer could not be hung from the mast vertically over the drill rod.

In order to proceed with the proposed program, Golder, in consultation with the Agnico-Eagle Mines Limited (AEM) Meadowbank Division, Engineering Department, coordinated a modified sampling approach using an air track drill to advance the boreholes and a loader to support the hammer during operation. Specifically, a Rockmaster RM-115 ITH air track drill supplied by Fernand Gilbert Ltée. (FGL) was used to advance the boreholes using a downhole hammer drilling technique (Photograph 4), and a Caterpillar 966 Loader supplied by AEM was used to lift/operate the hammer (Photographs 5 and 6).

As the air track drill utilised a J-thread, tapered type drill rod rather than a diamond drill NW-sized threaded drill rod compatible with the energy calibration equipment and LPT sampler, four 3 m long lengths of HQ-sized drill rod and suitable adaptors were provided by Orbit-Garant to enable the LPT program to be carried out. However, as the HQ-sized drill rods were only available in 3 m lengths, the LPT tests could not be completed at 1.5 m intervals as originally planned.

Initially, the boreholes were advanced in uncased holes (BH09-01); however, it was found that the boreholes could not be kept open below a depth of approximately 3 to 4 m using this technique. As such, it was decided to case the holes using 130 mm diameter water well casing. This required the casing to be welded in-situ as the boreholes were advanced. Upon completion of the each borehole, the casing was pulled and re-cut into sections for re-use.

2.0 LPT PROGRAM RESULTS

2.1 Field Work

A total of six boreholes (BH09-01 to BH09-06) were advanced along the centre line of the north portion of the Bay-Goose Dike. A summary the borehole program, including the number and depth of test samples that were collected in each borehole, is presented in Appendix II.

A summary of the measured LPT N-value blow counts and intervals sampled are provided below in Table 1. Laboratory test results on the samples collected, including grain size characterizations and moisture contents, are provided in Appendix III.

Table 1: LPT Testing Results

Borehole ID	Station Number On Centre Line	Total Depth (m)	Test Depth Interval (m)	LPT N-Value (blows/0.3 m)	Depth to Static Water Level (m b.g.s.)
BH09-01	30+431.3	3.65	3.05 to 3.65	4	2.20
BH09-02	30+440	9.45	3.35 to 3.65	30	2.25
BH09-02	30+440	9.45	6.1 to 6.7	11	2.25
BH09-02	30+440	9.45	9.1 to 9.45	7	2.25
BH09-03	30+550	6.1	3.35 to 3.95	20	2.23
BH09-04	30+560	6.4	3.35 to 3.95	24	2.38
BH09-04	30+560	6.4	5.8 to 6.4	13	2.38
BH09-05	30+570	6.55	3.35 to 3.95	26	2.45
BH09-05	30+570	6.55	6.25 to 6.55	11[1]	2.45
BH09-06	30+580	4.6	3.35 to 3.95	23	2.45

NOTE:

1. For this sample, the LPT N-value represents blows per 150 mm rather than the standard 300 mm, as refusal on bedrock occurred while driving the sampler.

Only one LPT was conducted in BH09-01 as the hole was uncased and could not be kept open. Since borehole BH09-01 collapsed after the drill rods were extracted, it is likely that the LPT was carried out within disturbed materials and thus the LPT test results collected in this borehole are not considered to be representative.

BH09-03 met refusal on bedrock at 6.1 m before a second LPT could be conducted. The second LPT in BH09-05 met refusal after the second test interval, and as such, the LPT N-value is only for 150 mm and not 300 mm. Only one LPT was performed in BH09-06 as the casing broke when the drill bit was at an approximate depth of 4.6 m and the hole was terminated.

As anticipated, the soils encountered in the boreholes consisted of sand and gravel fill with some silt. However, in BH09-05 at 6.25 to 6.55 m b.g.s, glacial till or more likely core backfill material with high silt content was encountered overlying the bedrock.

2.2 LPT-SPT Correlation

As mentioned above, the LPT is a non-traditional testing method that has been developed to test and sample gravelly soil deposits, and as such, no direct correlation between LPT N-values and industry standard density measurements currently exists. However, correlations have been developed to convert LPT N-values to SPT N_{60} values (SPT N-values corrected to a hammer efficiency of 60%) and then indirectly to density by converting SPT N_{60} values to SPT $(N1)_{60}$ values taking into account the effective stresses at the depth of measurements.

Recent research conducted at the University of British Columbia (Daniel et. al., 2003; and Daniel and Howie, 2009) provide methods for converting LPT N-values to equivalent SPT N_{60} values using PDA energy measurements as a way of calibrating the hammer. Effective stresses required to convert SPT N_{60} values to SPT $(N1)_{60}$ values can be represented to a first approximation by considering effective overburden pressures. A density of approximately 2200 kg/m^3 was assumed for the core backfill materials in calculating approximate effective overburden pressures. This represents 95% of the Standard Proctor Density (SPD) obtained from a sample of the core backfill material (SA-19) collected during Bay-Goose Dike construction.

Table 2 below summarizes the LPT N-value to SPT $(N1)_{60}$ correlation results determined using these methods, while Table 3 describes the industry standard for interpreting density from corrected SPT $(N1)_{60}$ values. Figure 3 shows the equivalent SPT $(N1)_{60}$ values obtained from the program plotted against depth.

Table 2: LPT-SPT Conversion Results

BH ID [1]	Test Interval (m)	LPT N-Value (blows/300 mm)	Equivalent SPT $(N1)_{60}$ Value (blows/300 mm)
BH09-02	3.35 to 3.65	30	27
BH09-02	6.1 to 6.7	11	11
BH09-02	9.1 to 9.45	7	4
BH09-03	3.35 to 3.95	20	21
BH09-04	3.35 to 3.95	24	26
BH09-04	5.8 to 6.4	13	15
BH09-05	3.35 to 3.95	26	27
BH09-05	6.25 to 6.55	11 [2]	10 [2]
BH09-06	3.35 to 3.95	23	24

NOTES:

1. SPT $(N1)_{60}$ value for the sample obtained between 3.05 to 3.65 m depth in BH09-01 was not calculated as the LPT was carried out within disturbed and/or collapsed materials and thus is considered not to be representative.
2. For this sample, LPT N-value and correlated SPT $(N1)_{60}$ value represent blows per 150 mm rather than the standard 300 mm, as refusal on bedrock occurred while driving the sampler.

Table 3: SPT $(N1)_{60}$ Value to Density Correlation (Craig, 1992)

SPT $(N1)_{60}$ Value Range (blows/0.3 m)	Relative Density
0 – 3	Very Loose
3 – 8	Loose
8 – 25	Compact
25 – 42	Dense
42 – 58	Very Dense

3.0 DISCUSSION

Given the schedule delays experienced at the beginning of the LPT program, the relative density of the core backfill materials with depth prior to compaction could not be evaluated. However, testing results suggest that dynamic compaction was effective at achieving compact to dense soil conditions up to depths of approximately 7 to 8 m.

The one LPT sample obtained from a depth of 9.1m to 9.45 m depth within borehole BH09-02 has been inferred to be potentially loose. However, for the reasons discussed below, it should be noted that the use of an air rotary, pneumatic drill rig was not optimal for this type of testing program.

An air rotary, pneumatic drill rig uses a down hole hammer that is operated with compressed air to “under-scour” the drill casing. The air is then recycled up through the casing to clear the cuttings from the drill bit. The casing, if necessary, is then advanced by the drive head at surface. When drilling occurs below the groundwater table (*i.e.*, at greater depths), the air energises the water, which leads to potential soil disturbance ahead of the drill bit. Further disturbance may also occur when the air is turned off and water flows back into the casing. This potentially leads to testing and sampling of disturbed soils at each test interval, which suggests that the density of the in-situ soils may be higher than what is inferred from the test results.

4.0 CLOSURE

We trust the information contained in this technical memorandum meets your requirements at this time. Should you have any questions, please do not hesitate to contact the undersigned.

Yours very truly,

GOLDER ASSOCIATES LTD.

ORIGINAL SIGNED

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Attachments: Figures
Photographs
Appendix I – Technical Memorandum 09-1428-5007 Doc. No. 1124 Ver. 0. Energy Measurements on Large Penetration Test (LPT) Hammer, Bay-Goose Dike, Meadowbank Project
Appendix II – LPT Borehole Summary
Appendix III – Laboratory Test Results

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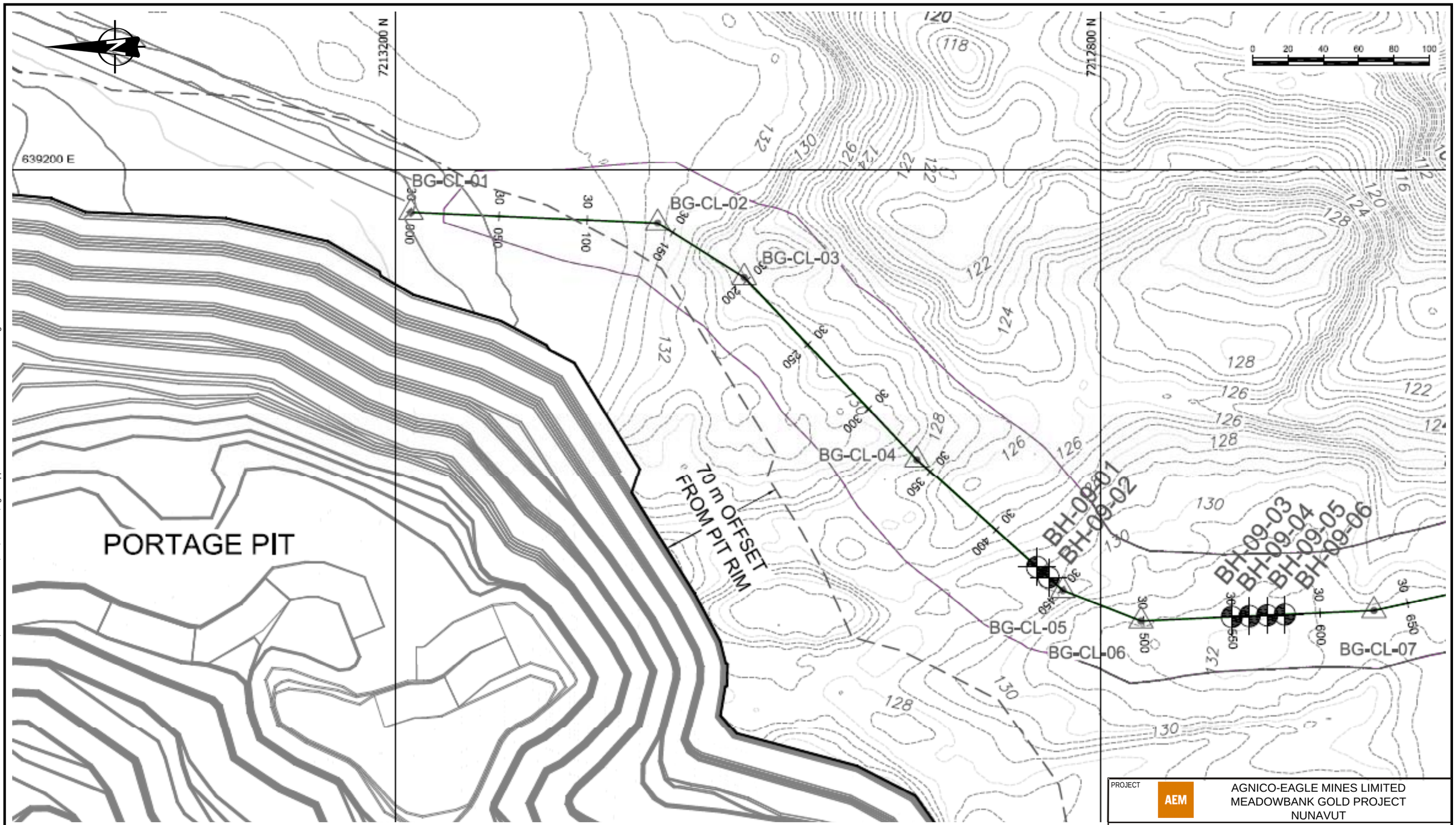

LEGEND:

- LPT BOREHOLE
- BAY-GOOSE CENTRELINE SETOUT POINT

PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

BAY-GOOSE DIKE
BOREHOLE PLAN – IN-SITU TESTING

Golder Associates

PROJECT No. 08-1428-0029			PHASE No. 5000	
DESIGN	CH	30OCT09	SCALE AS SHOWN	REV.
CADD	VTR	30OCT09	**FIGURE 1**	
CHECK				
REVIEW				

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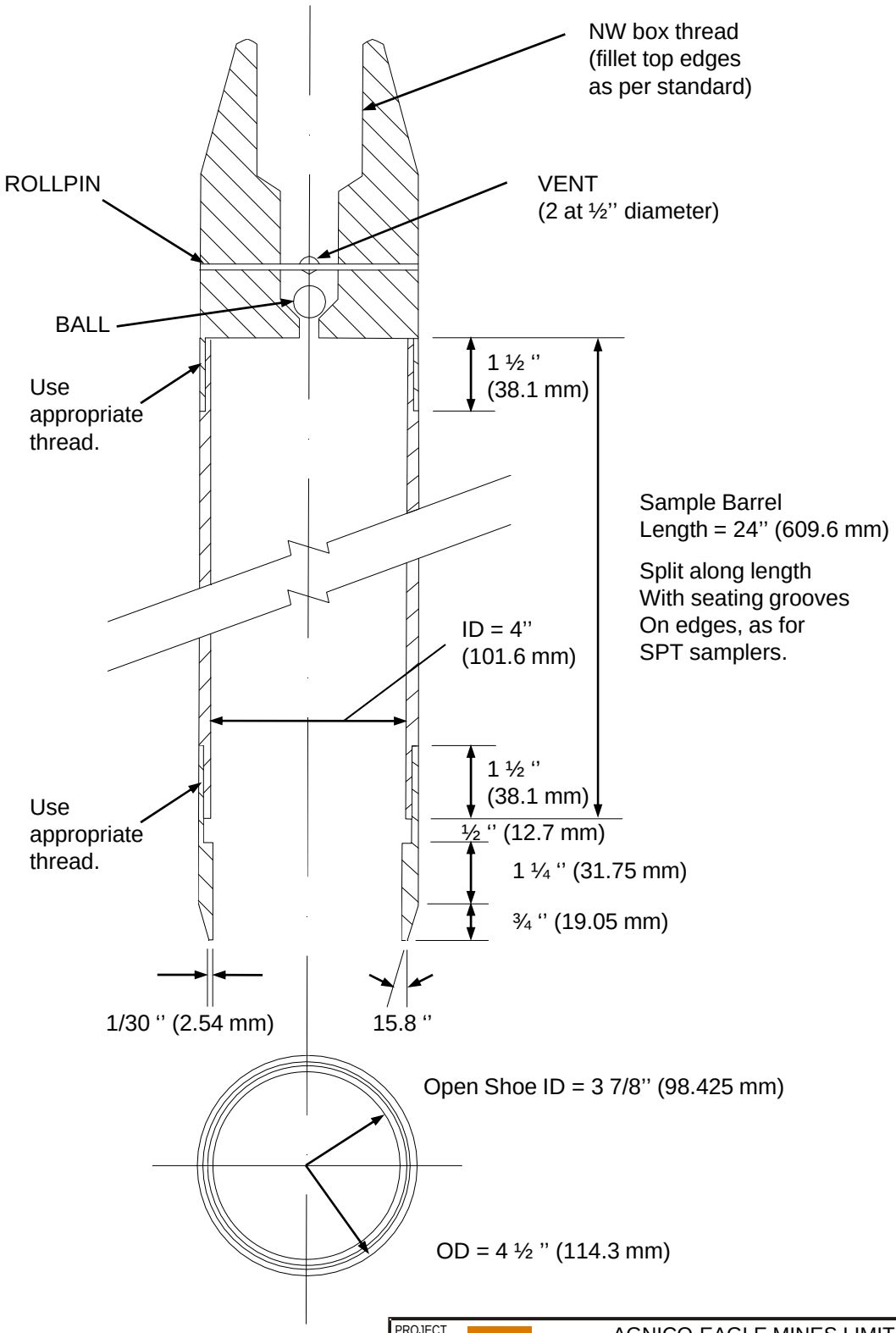


PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

BAY-GOOSE DIKE CONSTRUCTION
LPT SPECIFICATIONS

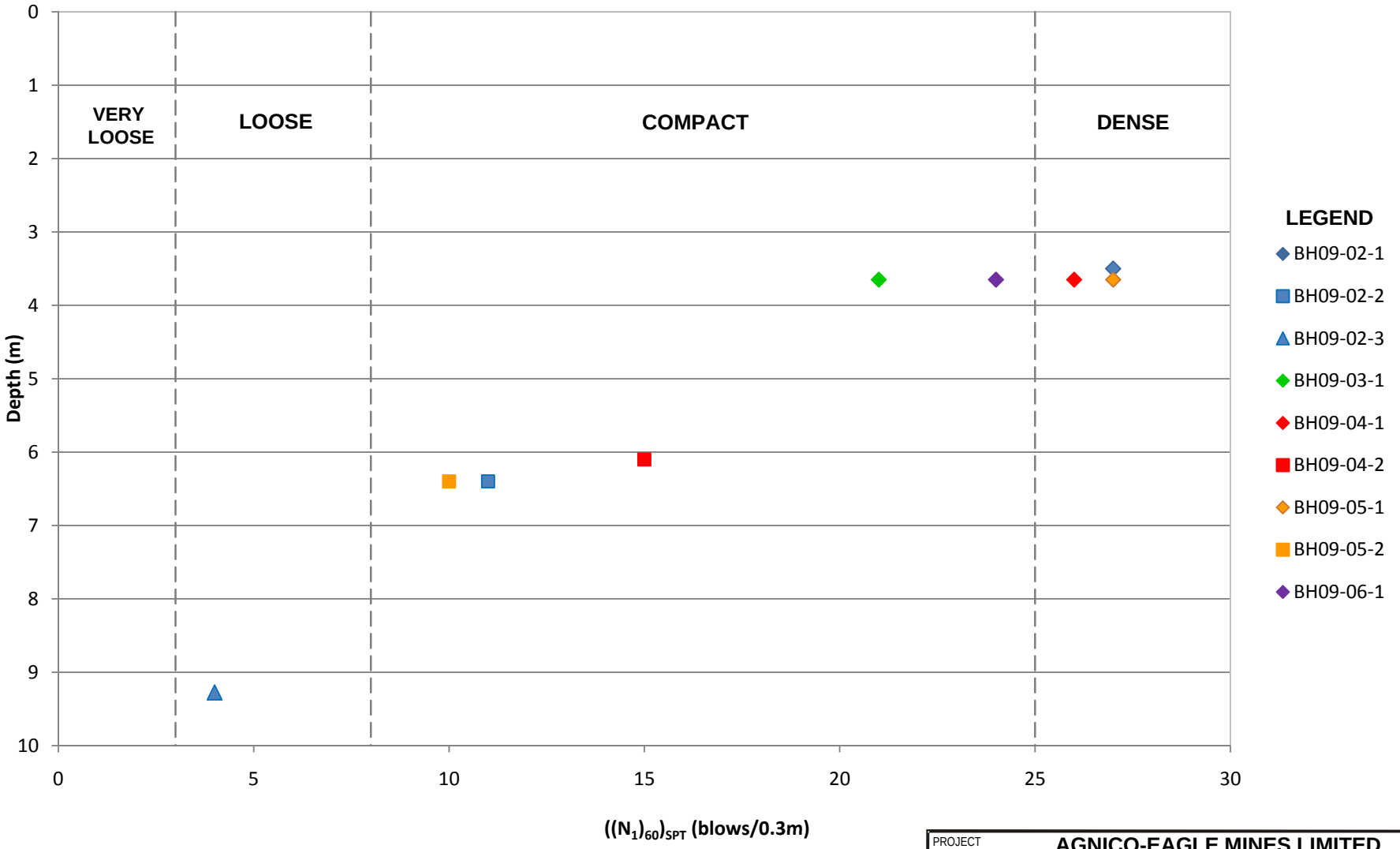
Golder Associates

PROJECT No. 09-1428-5007			PHASE No.	
DESIGN	GRB	09NOV09	SCALE NTS	REV. -
CADD	VTR	09NOV09		
CHECK				
REVIEW				

FIGURE 2

Reference:
Drawing provided by Dr. J.A. Howie, University of British Columbia from C.Daniel Ph.D research on LPT Design, March 2003.

FILE: O:\ACTIVE_2009\1428\09-1428-5007 MEADOWBANK 2009 DIKE CONSTRUCTION\6 - BAY GOOSE DIKE\LPT\FIGURES\Figure 2.ppt DATE: 09-NOV-2009 BY: gbonin



NOTES:

1. LPT N-value and correlated SPT N_{60} value for BH09-04-2 represent blows per 150 mm rather than the standard 300 mm as refusal on bedrock occurred while driving the sampler.
2. SPT $(N1)_{60}$ value for BH09-01-1 is not presented as the LPT was carried out within disturbed and/or collapsed materials and is thus not considered to be representative.

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
BAY GOOSE LPT TESTING PROGRAM EQUIVALENT $(N1)_{60}$ VALUES

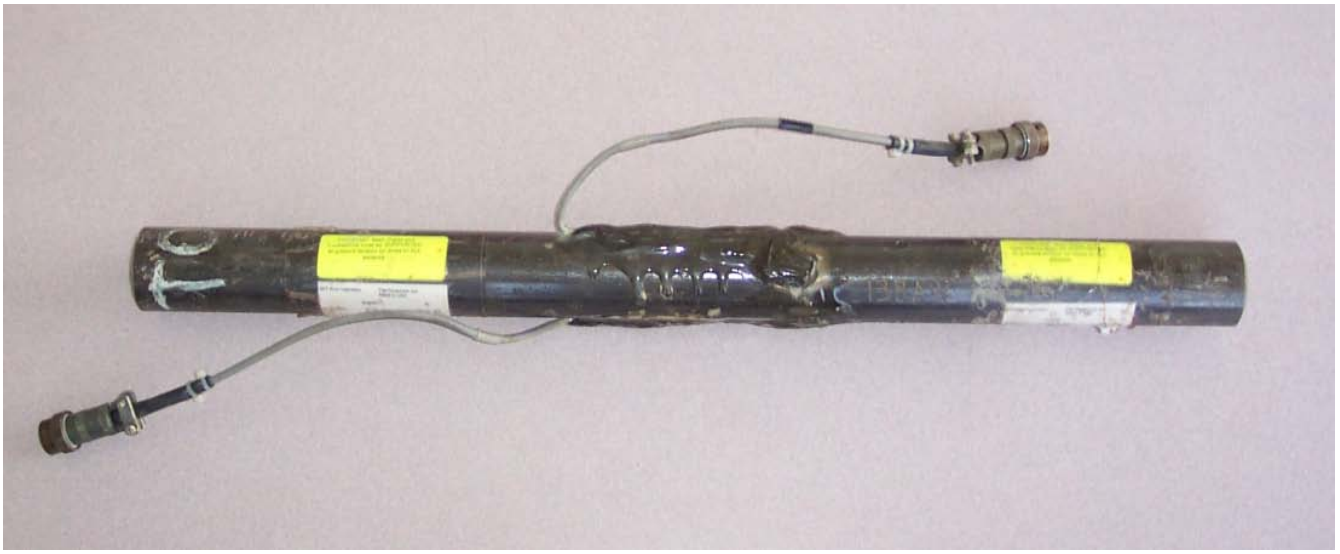
Golder Associates

PROJECT No. 09-1428-5007			PHASE No. 3000	
DESIGN	GRB	10DEC09	SCALE NTS	REV.
CADD	CH	10DEC09		
CHECK				
REVIEW				

FIGURE 3

Photograph 1: Large Penetration Test (LPT) Sampler

Photograph 2: Foremost-Mobile 109.1 kg (240 lbs.) self-compensating, automatic drop hammer



Photograph 3: Pile Driver Analyzer. NW drill rod fixed with two strain gauges and two accelerometers

Photograph 4: Rockmaster RM-115 ITH air rotary pneumatic, downhole hammer drill rig

Photograph 5: Caterpillar 966 Loader with LPT hammer attached

Photograph 6: Caterpillar 966 Loader with LPT hammer attached and Rockmaster RM-155

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APPENDIX I

Technical Memorandum 09-1428-5007 Doc. No. 1124 Ver. 0. Energy Measurements on Large Penetration Test (LPT) Hammer, Bay-Goose Dike, Meadowbank Gold Project, Nunavut

TECHNICAL MEMORANDUM

DATE November 24, 2009 **PROJECT No.** 09-1428-5007/3000

TO Grant Bonin
Golder Associates Ltd.

CC Dan Walker; Michel Julien; Charlie Harrison

FROM M. (Yogi) Yogendrakumar **EMAIL** myogendrakumar@golder.com

ENERGY MEASUREMENTS ON LARGE PENETRATION TEST (LPT) HAMMER, BAY GOOSE DIKE, MEADOWBANK PROJECT

This memorandum presents the results of the energy measurements carried out by Golder Associates Ltd. (Golder) during Large Penetration Testing (LPT) at the above project site. The energy measurements were carried out in accordance with ASTM Standard Designation D 4633-05. The Force Velocity method (EFV) was used to compute the energy that was delivered to the LPT sampling rods during testing.

1.0 INTRODUCTION

Golder carried out energy measurements during the LPT testing program during our site visit between September 18 and 20, 2009 as part of the quality assurance program on the Bay Goose Dike core backfill placement and dynamic compaction at the Meadowbank project site. The LPTs were carried out within boreholes BH09-01 to BH09-06 put down along the centre line of the dike at Stations 30+431.3, 30+440, 30+550, 30+560, 30+570, and 30+580. The boreholes were advanced using an air rotary RM-115 rock master drill using 133 mm diameter welded casing. The energy measurements were carried out during LPT testing at depths of about 3 m, 6 m and 9 m below the ground surface.

2.0 INSTRUMENTED RODS AND HAMMER

Owing to the configuration of available diamond drill rigs on site, a production air rotary drill rig with HQ standard drilling rod within the 133 mm diameter welded casing was used for the LPT program. The HQ rod was used only for carrying out the LPTs, and not for advancing the boreholes. An instrumented 0.6 m (2 ft) subassembly of AW rod, which matches the drill rod type, was used in the energy measurements. The subassembly of AW rod was instrumented with two strain gauges and two accelerometers. The accelerometers used are capable of measuring the acceleration of high impact steel (PR Type). A pile driving analyzer (PDA) unit was used to record strains and accelerations for every blow.

The LPT hammer hoisted by an excavator was used in the penetration testing. A photograph of the LPT hammer used for the testing is shown in Figure 1 below.

The energy transfer ratio (ETR) (*i.e.,* efficiency) was computed based on the theoretical potential energy of 0.81 kNm, which is equivalent to a 1.068 kN (240 lbs) of weight falling a distance of 0.76 m (30 inches).

Figure 1: LPT Hammer Hoisted by a Caterpillar 966 Front End Loader

3.0 SUMMARY OF RESULTS

Tables 1 to 6 summarize the results of energy measurements carried out during the penetration testing at various depths for the boreholes BH09-01 to BH09-06, respectively. A statistical average and standard deviation of ETR and the maximum of ETR computed from the entire blow counts for the depth are also shown in the Tables.

Table 1: Results for BH09-01

Depth (m)	Blows Counts (for 6 inches)	Energy Transfer Ratio (ETR)			Comments
		Average (%)	Std. Deviation (%)	Maximum (%)	
3.05	1/2/2	75.9	3.1	79.5	Only 4 blows recorded

Table 2: Results for BH09-02

Depth (m)	Blows Counts (for 6 inches)	Energy Transfer Ratio (ETR)			Comments
		Average (%)	Std. Deviation (%)	Maximum (%)	
3.35	12/18/12	79.8	4.9	86.6	Only 8 blows recorded
6.10	3/5/6/6	83.9	2.3	92.1	
9.10	3/3/4	91.2	1.2	92.6	

Table 3: Results for BH09-03

Depth (m)	Blows Counts (for 6 inches)	Energy Transfer Ratio (ETR)			Comments
		Average (%)	Std. Deviation (%)	Maximum (%)	
3.35	6/10/10/9	94.3	2.5	98.8	

Table 4: Results for BH09-04

Depth (m)	Blows Counts (for 6 inches)	Energy Transfer Ratio (ETR)			Comments
		Average (%)	Std. Deviation (%)	Maximum (%)	
3.35	4/11/13/13	93.0	2.6	97.8	
5.8	4/6/6/7	93.0	2.6	100.6	

Table 5: Results for BH09-05

Depth (m)	Blows Counts (for 6 inches)	Energy Transfer Ratio (ETR)			Comments
		Average (%)	Std. Deviation (%)	Maximum (%)	
3.35	11/13/11/14	91.7	3.1	97.5	
6.25	3/11/*	90.1	1.5	92.5	

*refusal

Table 6: Results for BH09-06

Depth (m)	Blows Counts (for 6 inches)	Energy Transfer Ratio (ETR)			Comments
		Average (%)	Std. Deviation (%)	Maximum (%)	
3.35	7/11/12/13	88.4	3.7	93.5	

4.0 CLOSURE

We trust that this memorandum provides adequate information for your immediate purposes. Should you have any questions or comments, please contact us.

GOLDER ASSOCIATES LTD.

ORIGINAL SIGNED

Jian Zhong (James) Jin, E.I.T.
Geotechnical Engineer

ORIGINAL SIGNED

M. (Yogi) Yogendrakumar, Ph.D., P.Eng.
Principal, Senior Geotechnical Engineer

JJ/MY/js

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APPENDIX II

LPT Borehole Summary

Borehole No.	Depth (m)	Description	Sample/Test No. w/ Depth (m)
BH09-01 (sta. 30+430) collar elev. ~ 135.90 m.a.s.l.	0.0 – 3.65	Compact to dense, moist to wet, grey, SAND and GRAVEL, some silt. (Core Backfill) ■ No sample recovery. ■ End of borehole at 3.65 m b.g.s. ■ Surveyed lake surface elevation was approx. 133.7 m.a.s.l. ■ Static water level was approx. 2.2 m b.g.s.	Sa. 1 3.05 – 3.65

Logged by: CH
Date: September 18, 2009

Borehole No.	Depth (m)	Description	Sample/Test No. w/ Depth (m)
BH09-02 (sta. 30+440) collar elev. ~ 135.95 m.a.s.l.	0.0 – ~ 8.5	Dense to compact, moist to wet, grey, SAND and GRAVEL, some silt. (Core Backfill)	Sa. 1 3.35 – 3.65 Sa. 2 6.1 – 6.7
	~ 8.5 – 9.45	Loose, wet, grey, silty SAND and GRAVEL. ■ End of borehole at 9.45 m b.g.s. ■ Surveyed lake surface elevation was approx. 133.7 m.a.s.l. ■ Static water level was approx. 2.25 m b.g.s.	Sa. 3 9.1 – 9.45

Logged by: CH
Date: September 19, 2009

Borehole No.	Depth (m)	Description	Sample/Test No. w/ Depth (m)
BH09-03 (sta. 30+550) collar elev. ~ 135.93 m.a.s.l.	0.0 – 6.1	Dense to compact, moist to wet, grey, SAND and GRAVEL, some silt. (Core Backfill) ■ End of borehole at 6.1 m b.g.s. ■ Surveyed lake surface elevation was approx. 133.7 m.a.s.l. ■ Static water level was approx. 2.23 m b.g.s.	Sa. 1 3.35 – 3.95

Logged by: CH
Date: September 20, 2009

Borehole No.	Depth (m)	Description	Sample/Test No. w/ Depth (m)
BH09-04 (sta. 30+560) collar elev. ~ 136.08 m.a.s.l.	0.0 – 6.4	Dense to compact, moist to wet, grey, SAND and GRAVEL, some silt. (Core Backfill) ■ No sample recovery from 5.8 to 6.4 m ■ End of borehole at 6.4 m b.g.s. ■ Surveyed lake surface elevation was approx. 133.7 m.a.s.l. ■ Static water level was approx. 2.38 m b.g.s.	Sa. 1 3.35 – 3.95

Logged by: CH
Date: September 20, 2009

Borehole No.	Depth (m)	Description	Sample/Test No. w/ Depth (m)
BH09-05 (sta. 30+560) collar elev. ~ 136.15 m.a.s.l.	0.0 – 6.35	Dense, moist to wet, grey, SAND and GRAVEL, some silt. (Core Backfill)	Sa. 1 3.35 – 3.95
	6.35 – 6.55	Compact, damp to moist, grey, silty SAND and GRAVEL (Till or Core Backfill with silt). ■ End of borehole at 6.55 m b.g.s. due to refusal on bedrock. ■ Surveyed lake surface elevation was approx. 133.7 m.a.s.l. ■ Static water level was approx. 2.45 m b.g.s.	Sa. 2 6.25 – 6.55

Logged by: CH
Date: September 20, 2009

Borehole No.	Depth (m)	Description	Sample/Test No. w/ Depth (m)
BH09-06 (sta. 30+570) collar elev. ~ 136.15 m.a.s.l.	0.0 – 4.6	Dense to compact, moist to wet, grey, SAND and GRAVEL, some silt. (Core Backfill) ■ End of borehole at 4.6 m b.g.s. due to broken casing. ■ Surveyed lake surface elevation was approx. 133.7 m.a.s.l. ■ Static water level was approx. 2.45 m b.g.s.	Sa. 1 3.35 – 3.95

Logged by: CH
Date: September 20, 2009

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APPENDIX III

Laboratory Test Results

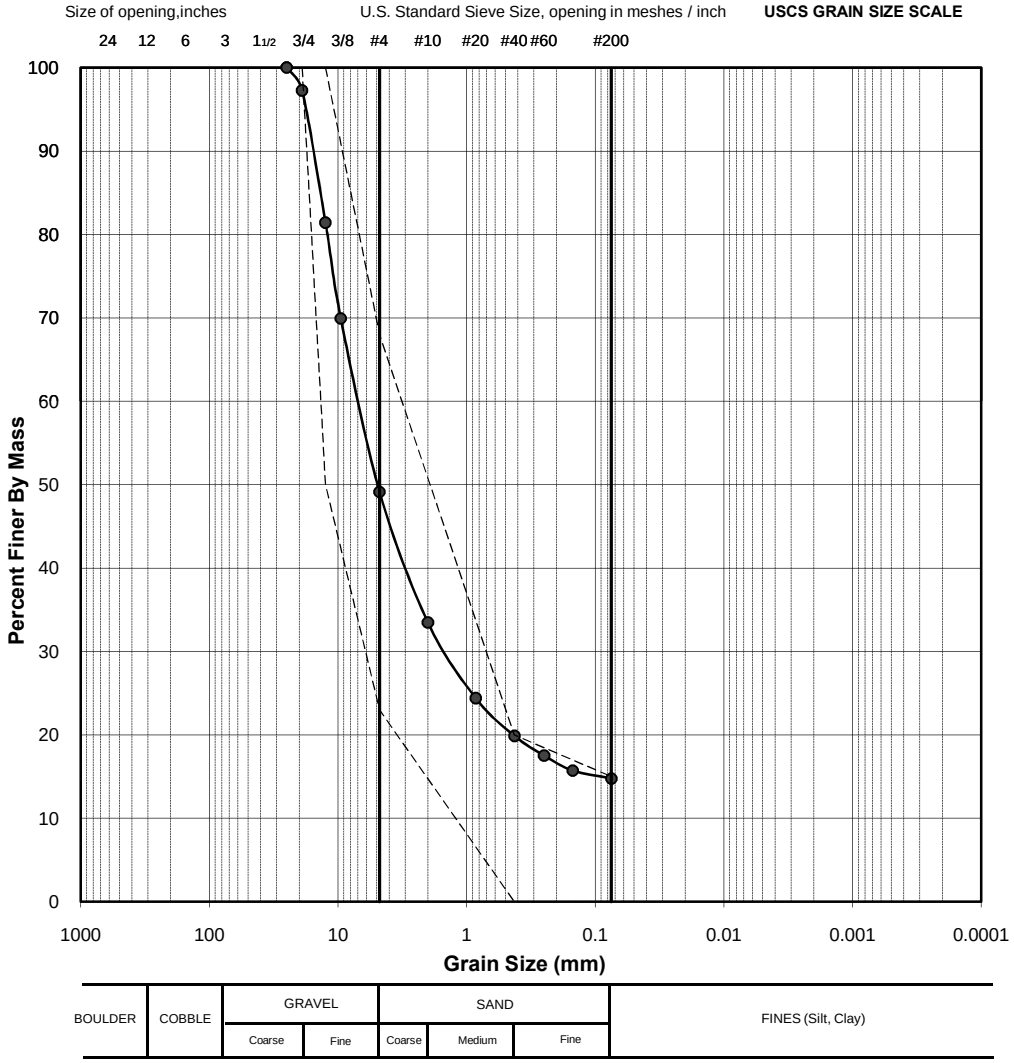
Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

PARTICLE SIZE ANALYSIS OF SOILS

Reference
ASTM C136-06 & C117-04

Project No.:	08-1428-0029 (5000)	**Sample No.:**	**67**
Client:	AEM	**Field Label:**	BH09-02-1
Project:	Meadowbank Gold Project	**Depth (m):**	3.35 - 3.65
Location:	Nunavut	**Lab ID No:**	SA-67
Remarks:	Water content = 1.6%	**Sampling Date:**	September 19, 2009
Borehole sample, Bay Goose Dike 30+440		**Material Specification:**	CORE BACKFILL
		Method:	SPLIT, WASHED
		Date Tested:	September 20, 2009

Sieve Size (USS)	Sieve Size (mm)	Passing %
3.5"	87.5	100.0
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.0	97.3
1/2"	12.5	81.4
3/8"	9.5	69.9
#4	4.8	49.1
#10	2.0	33.5
#20	0.9	24.4
#40	0.4	19.9
#60	0.3	17.5
#100	0.2	15.7
#200	0.1	14.8



** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

TESTED BY	DATE	CHECKED BY	DATE
OM	September 20, 2009		

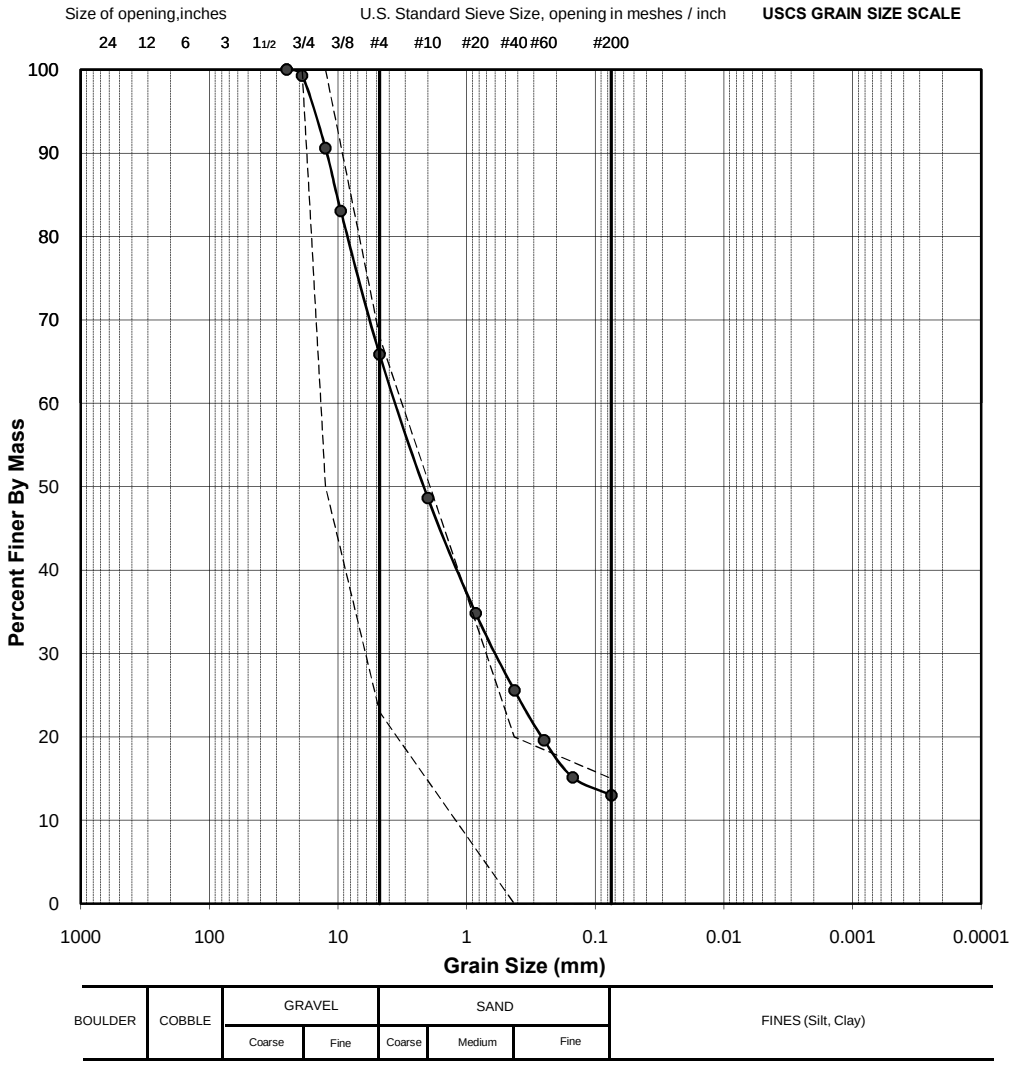
Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

PARTICLE SIZE ANALYSIS OF SOILS

Reference
ASTM C136-06 & C117-04

Project No.:	08-1428-0029 (5000)	**Sample No.:**	**68**
Client:	AEM	**Field Label:**	BH09-02-2
Project:	Meadowbank Gold Project	**Depth (m):**	6.1 - 6.7
Location:	Nunavut	**Lab ID No:**	SA-68
Remarks:	Water content = 1.6%	**Sampling Date:**	September 19, 2009
Borehole sample, Bay Goose Dike 30+440		**Material Specification:**	CORE BACKFILL
		Method:	SPLIT, WASHED
		Date Tested:	September 21, 2009

Sieve Size (USS)	Sieve Size (mm)	Passing %
3.5"	87.5	100.0
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.0	99.3
1/2"	12.5	90.6
3/8"	9.5	83.1
#4	4.8	65.9
#10	2.0	48.6
#20	0.9	34.8
#40	0.4	25.6
#60	0.3	19.6
#100	0.2	15.2
#200	0.1	13.0



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TESTED BY	DATE	CHECKED BY	DATE
OM	September 21, 2009		

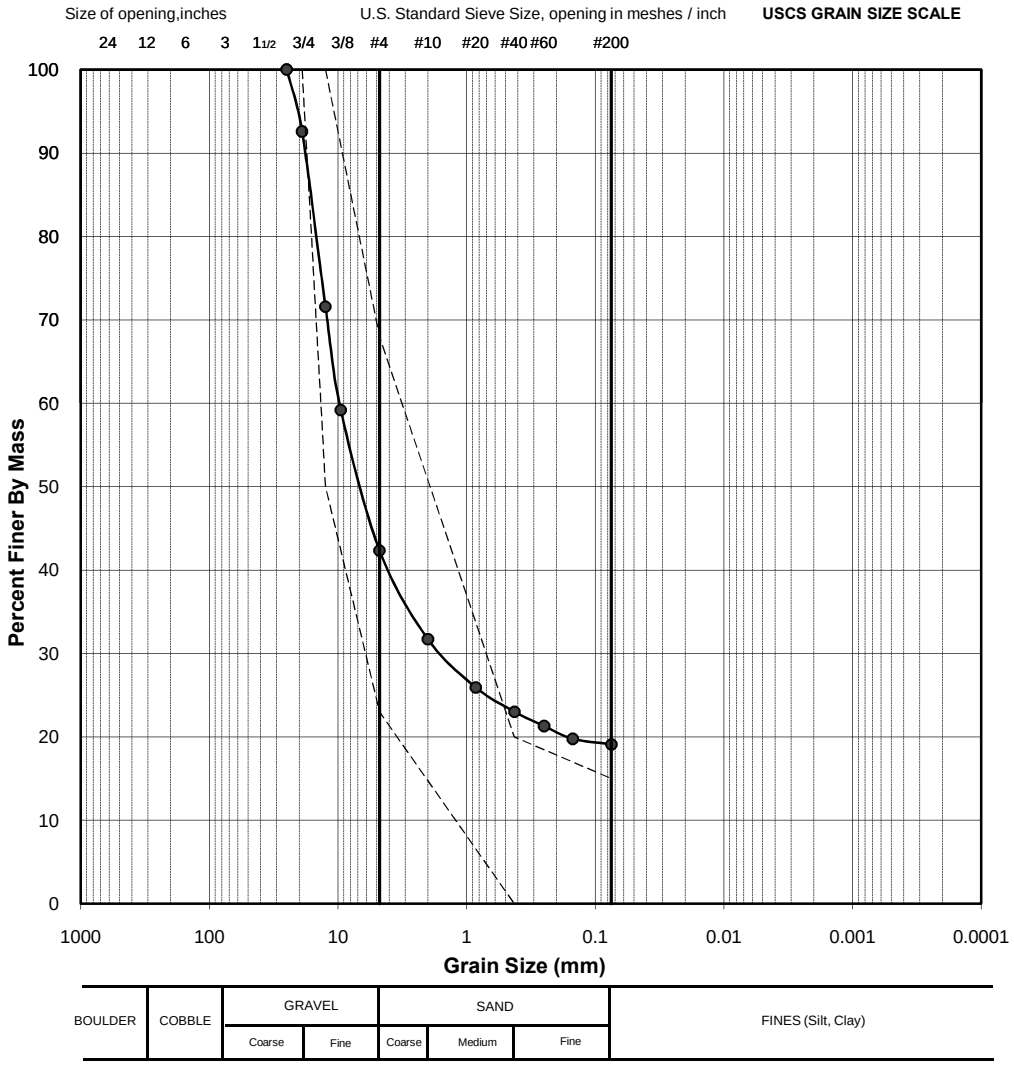
Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

PARTICLE SIZE ANALYSIS OF SOILS

Reference
ASTM C136-06 & C117-04

Project No.:	08-1428-0029 (5000)	**Sample No.:**	**69**
Client:	AEM	**Field Label:**	BH09-02-3
Project:	Meadowbank Gold Project	**Depth (m):**	9.1 - 9.45
Location:	Nunavut	**Lab ID No:**	SA-69
Remarks:		**Sampling Date:**	September 19, 2009
Borehole sample, Bay Goose Dike 30+440		**Material Specification:**	CORE BACKFILL
		Method:	SPLIT, WASHED
		Date Tested:	September 20, 2009

Sieve Size (USS)	Sieve Size (mm)	Passing %
3.5"	87.5	100.0
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.0	92.6
1/2"	12.5	71.6
3/8"	9.5	59.2
#4	4.8	42.3
#10	2.0	31.7
#20	0.9	25.9
#40	0.4	23.0
#60	0.3	21.3
#100	0.2	19.8
#200	0.1	19.1



** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

OM	September 20, 2009		
TESTED BY	DATE	CHECKED BY	DATE

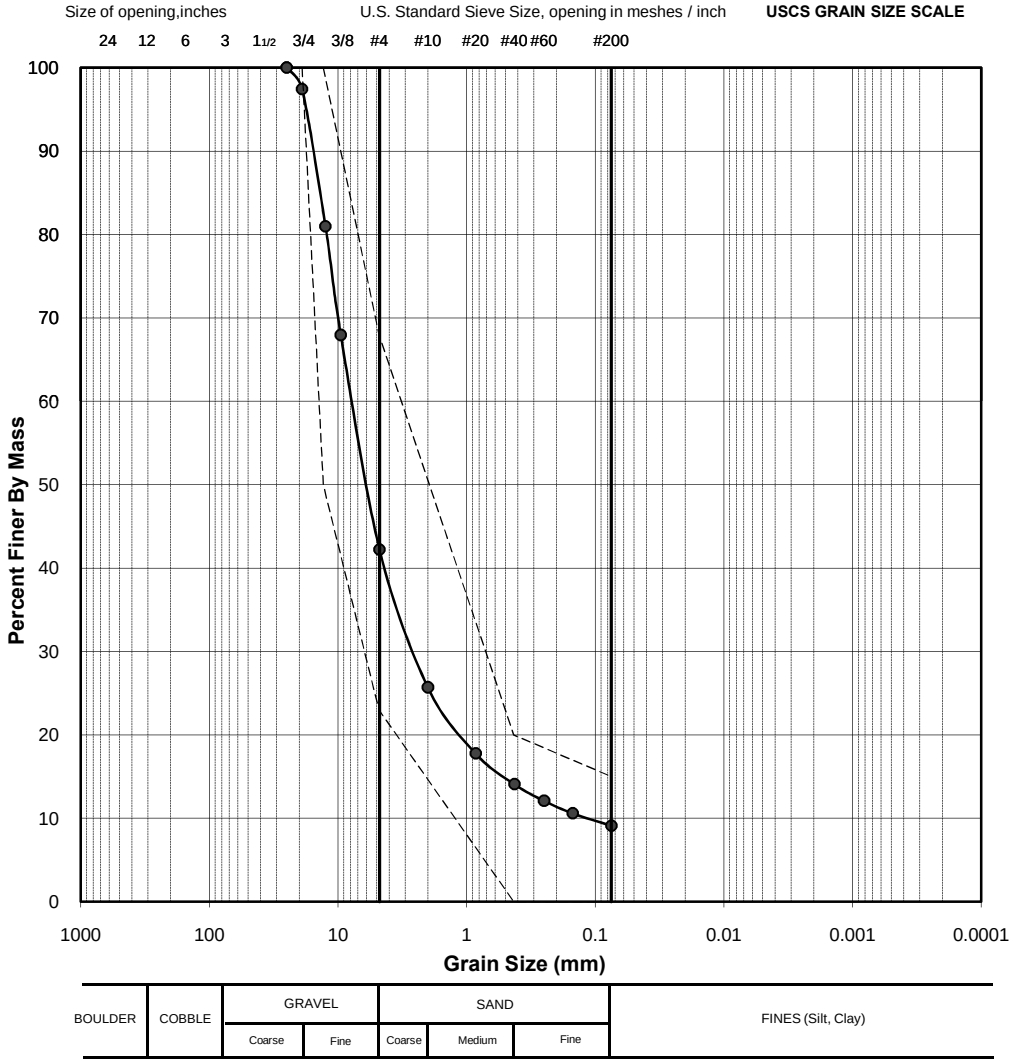
Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

PARTICLE SIZE ANALYSIS OF SOILS

Reference
ASTM C136-06 & C117-04

Project No.:	08-1428-0029 (5000)	**Sample No.:**	**78**
Client:	AEM	**Field Label:**	BH09-03-1
Project:	Meadowbank Gold Project	**Depth (m):**	3.4 - 4.0
Location:	Nunavut	**Lab ID No:**	SA-78
Remarks:		**Date Sampled:**	September 20, 2009
Borehole sample, Bay Goose Dike 30+550		**Material Specification:**	CORE BACKFILL
		Method:	COMBINED, WASHED
		Date Tested:	September 23, 2009

Sieve Size (USS)	(mm)	Passing %
3.5"	87.5	100.0
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.0	97.4
1/2"	12.5	81.0
3/8"	9.5	67.9
#4	4.8	42.2
#10	2.0	25.7
#20	0.9	17.8
#40	0.4	14.1
#60	0.3	12.1
#100	0.2	10.6
#200	0.1	9.1



** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

DE	September 23, 2009		
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

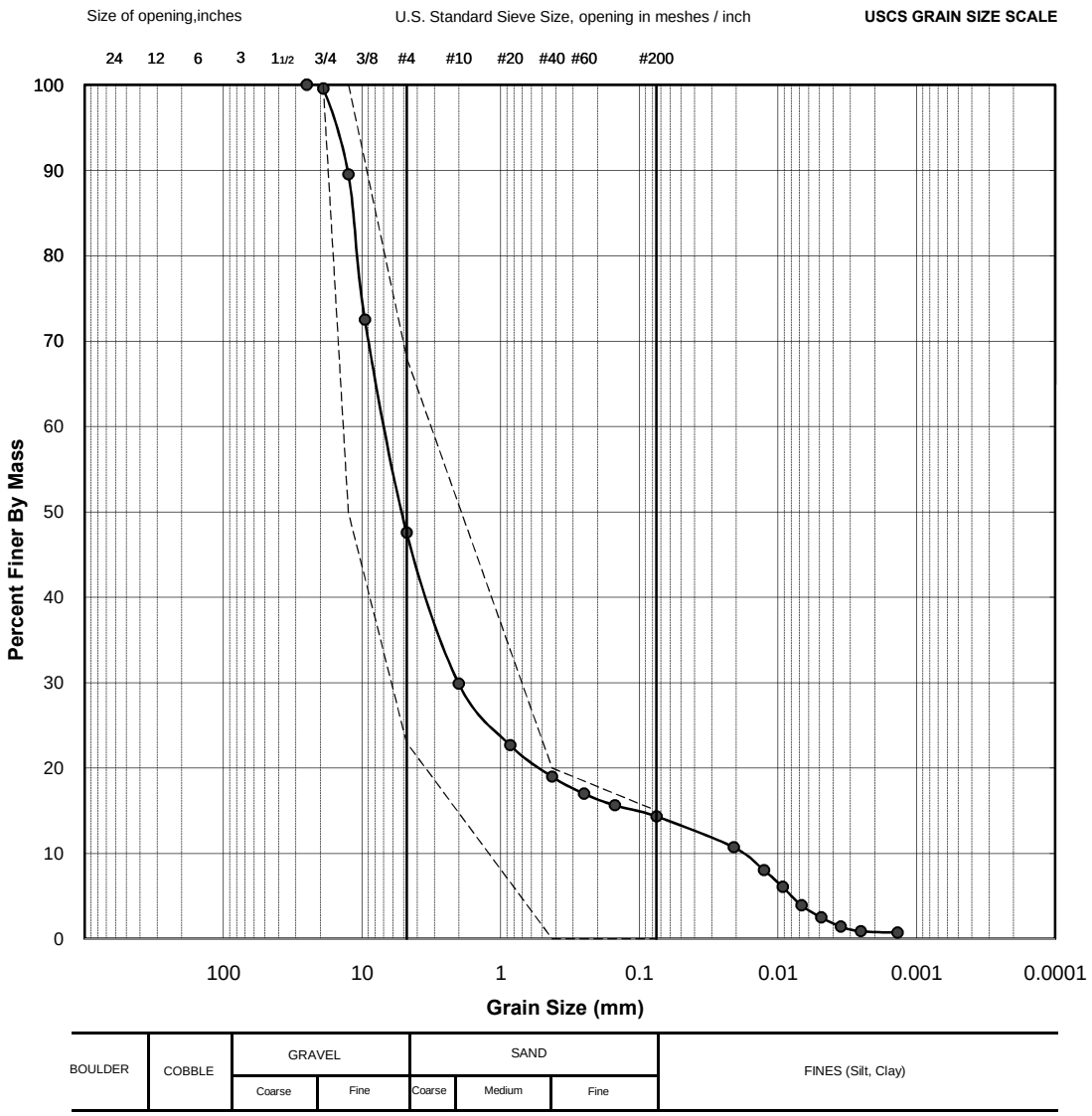
PARTICLE SIZE ANALYSIS OF SOILS

Reference
ASTM D 422-63 (2007)

Project No.:	09-1428-5007 (2000)	**Sample No.:**	**79**
Client:	AEM	**Field No.**	BH09-04-1
Project:	Meadowbank Gold Project	**Depth (m):**	3.35 - 3.95
Location:	Nunavut	**Lab ID No:**	SA-79

Specific Gravity (assumed):	2.70	**Other**	Borehole sample, Bay Goose Dike 30+560
Date Sampled:	September 20, 2009	**Remarks:**	
Dispersion Method:	Stirring		
Dispersion Period (min):	960.00		

Sieve Size (USS)	Sieve Size (mm)	% Passing
3.5"	87.50	100.0
3"	75.00	100.0
2"	50.00	100.0
1.5"	37.50	100.0
1"	25.00	100.0
3/4"	19.00	99.5
1/2"	12.50	89.5
3/8"	9.50	72.5
#4	4.75	47.6
#10	2.00	29.9
#20	0.850	22.7
#40	0.425	19.0
#60	0.250	17.0
#100	0.150	15.6
#200	0.075	14.3
-	0.0208	10.7
-	0.0126	8.0
-	0.0092	6.1
-	0.0068	3.9
-	0.0049	2.5
-	0.0035	1.4
-	0.0025	0.9
-	0.0014	0.7



** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

TESTED BY	DATE	CHECKED BY	DATE
DE	October 2, 2009		

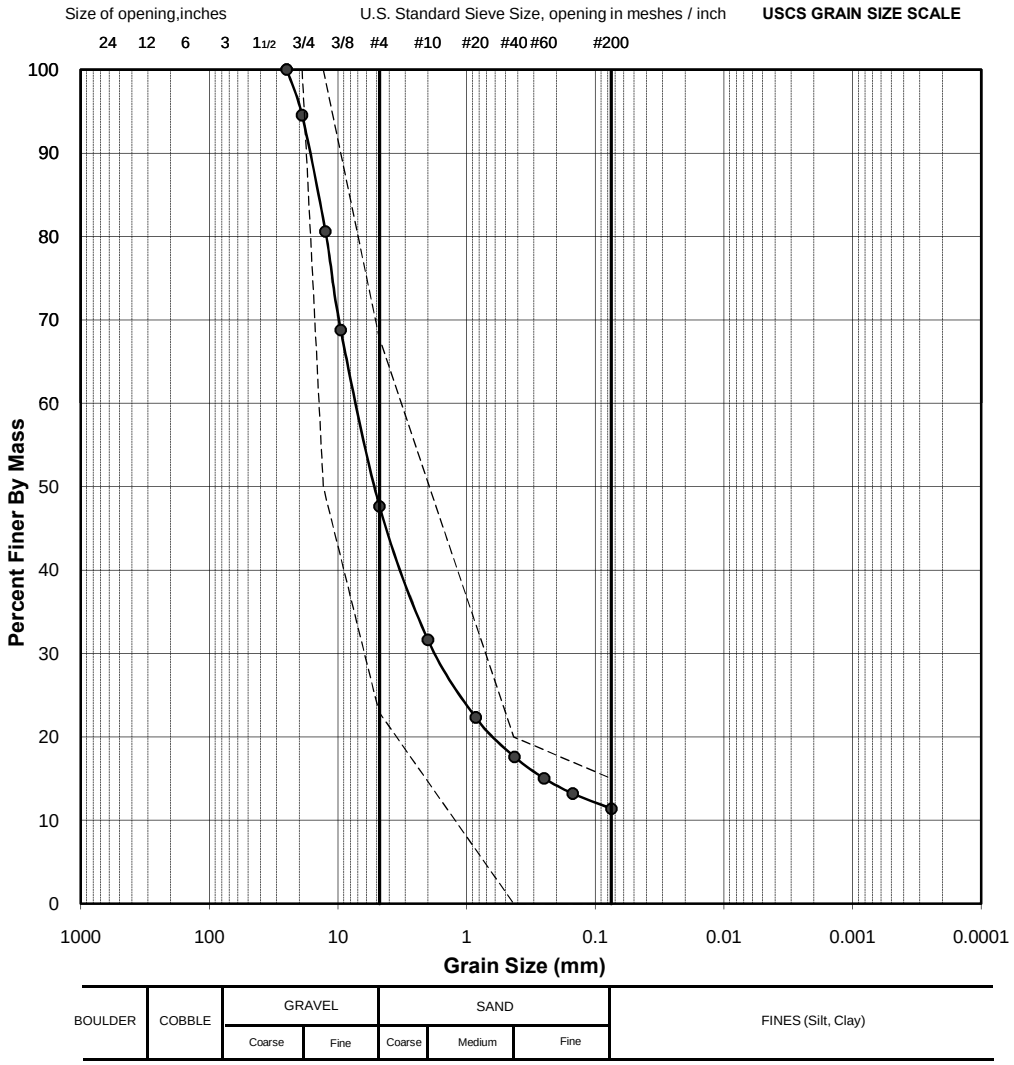
Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

PARTICLE SIZE ANALYSIS OF SOILS

Reference
ASTM C136-06 & C117-04

Project No.:	08-1428-0029 (5000)	**Sample No.:**	**83**
Client:	AEM	**Field Label:**	BH09-05-1
Project:	Meadowbank Gold Project	**Depth (m):**	3.4 - 4
Location:	Nunavut	**Lab ID No:**	SA-83
Remarks:		**Date Sampled:**	September 20, 2009
Borehole Sample, Bay Goose Dike 30+570		**Material Specification:**	CORE BACKFILL
		Method:	COMBINED, WASHED
		Date Tested:	September 26, 2009

Sieve Size (USS)	Sieve Size (mm)	Passing %
3.5"	87.5	100.0
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.0	94.5
1/2"	12.5	80.6
3/8"	9.5	68.8
#4	4.8	47.6
#10	2.0	31.6
#20	0.9	22.3
#40	0.4	17.6
#60	0.3	15.0
#100	0.2	13.2
#200	0.1	11.4



** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

DE	September 26, 2009		
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

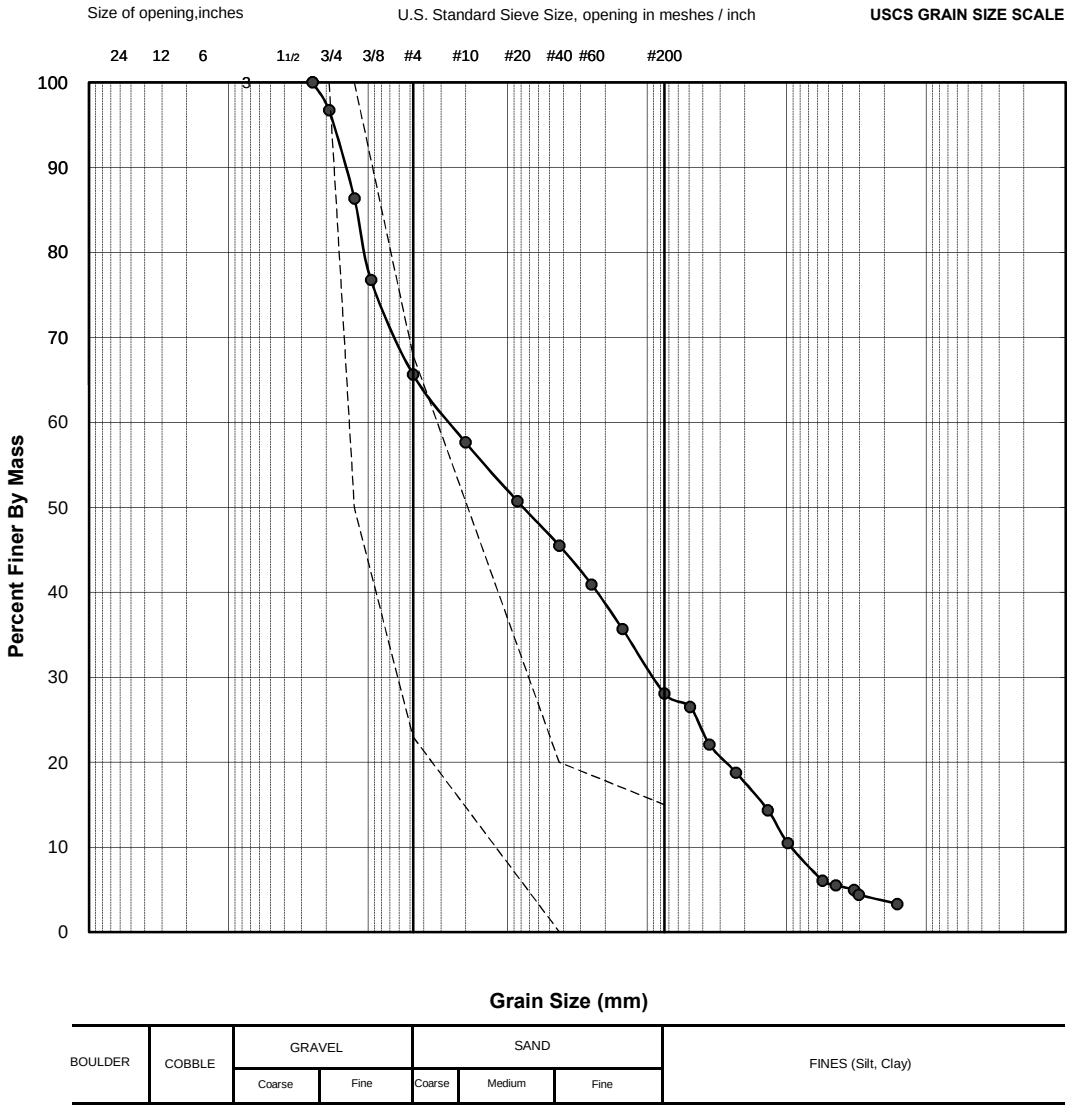
PARTICLE SIZE ANALYSIS OF SOILS

Reference
ASTM D 422-63 (2007)

Project No.:	08-1428-0029 (5000)	**Sample:**	**77**
Client:	AEM	**Field No.:**	BH09-05-2
Project:	Meadowbank Gold Project	**Depth (m):**	6.4 - 6.6
Location:	Nunavut	**Lab ID No:**	SA-77

Specific Gravity (assumed):	2.70	**Other**	Borehole sample, Bay Goose Dike 30+570
Date Sampled:	September 20, 2009	**Remarks:**	
Dispersion Method:	Stirring		
Dispersion Period (min):	960.00		

Sieve Size (USS)	Sieve Size (mm)	% Passing
3.5"	87.50	100.0
3"	75.00	100.0
2"	50.00	100.0
1.5"	37.50	100.0
1"	25.00	100.0
3/4"	19.00	96.7
1/2"	12.50	86.3
3/8"	9.50	76.7
#4	4.75	65.6
#10	2.00	57.6
#20	0.850	50.7
#40	0.425	45.5
#60	0.250	40.9
#100	0.150	35.7
#200	0.075	28.1
-	0.0492	26.5
-	0.0357	22.1
-	0.0230	18.8
-	0.0136	14.4
-	0.0098	10.5
-	0.0055	6.1
-	0.0044	5.5
-	0.0033	5.0
-	0.0030	4.4
-	0.0016	3.3



** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

TESTED BY	DATE	CHECKED BY	DATE
DE	September 27, 2009		

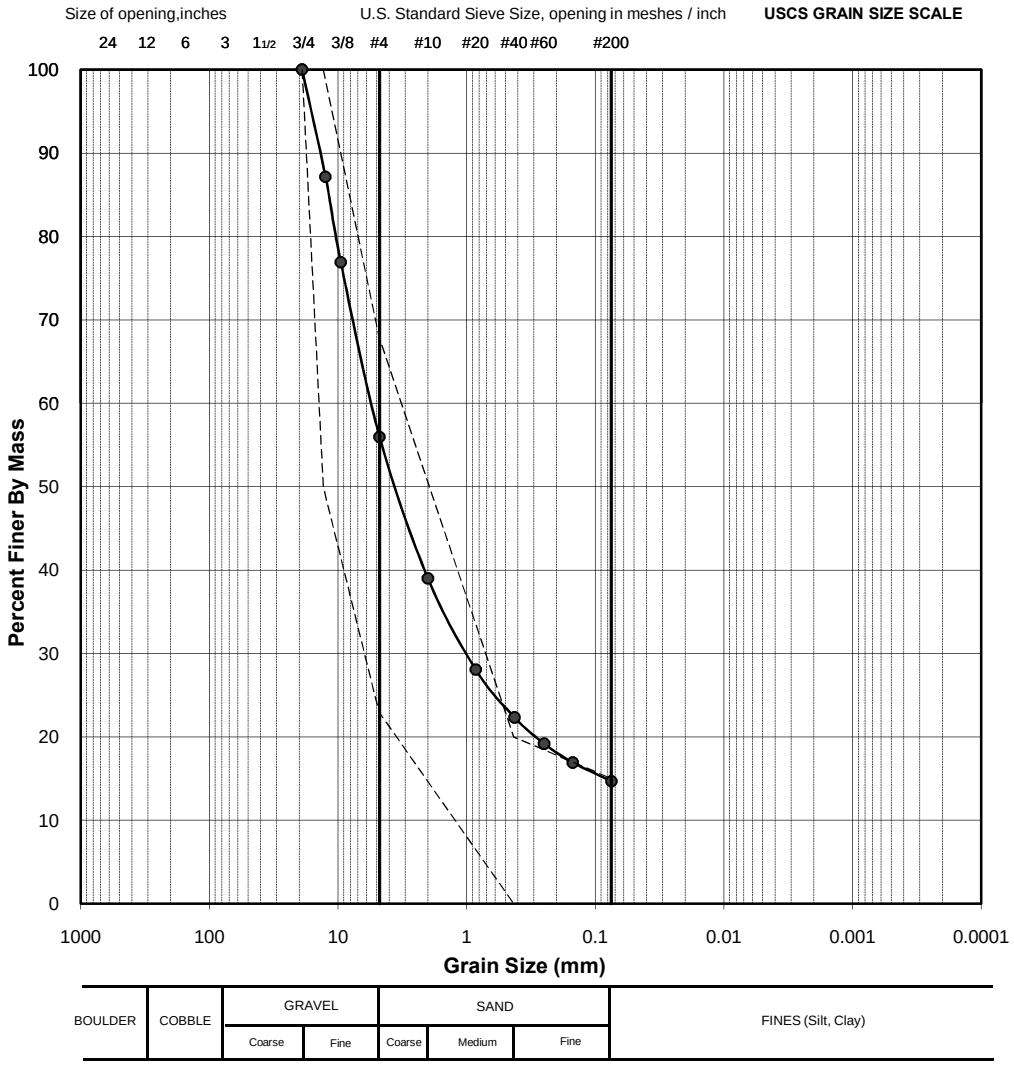
Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

PARTICLE SIZE ANALYSIS OF SOILS

Reference
ASTM C136-06 & C117-04

Project No.:	08-1428-0029 (5000)	**Sample No.:**	**82**
Client:	AEM	**Field Label:**	BH09-06-1
Project:	Meadowbank Gold Project	**Depth (m):**	3.4 - 4.0
Location:	Nunavut	**Lab ID No:**	SA-82
Remarks:		**Date Sampled:**	September 20, 2009
Borehole sample, Bay Goose Dike 30+580		**Material Specification:**	CORE BACKFILL
		Method:	COMBINED, WASHED
		Date Tested:	September 26, 2009

Sieve Size (USS)	Sieve Size (mm)	Passing %
3.5"	87.5	100.0
3"	75.0	100.0
2"	50.0	100.0
1.5"	37.5	100.0
1"	25.0	100.0
3/4"	19.0	100.0
1/2"	12.5	87.2
3/8"	9.5	76.9
#4	4.8	56.0
#10	2.0	39.0
#20	0.9	28.1
#40	0.4	22.3
#60	0.3	19.2
#100	0.2	16.9
#200	0.1	14.7



** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

DE	September 26, 2009		
TESTED BY	DATE	CHECKED BY	DATE